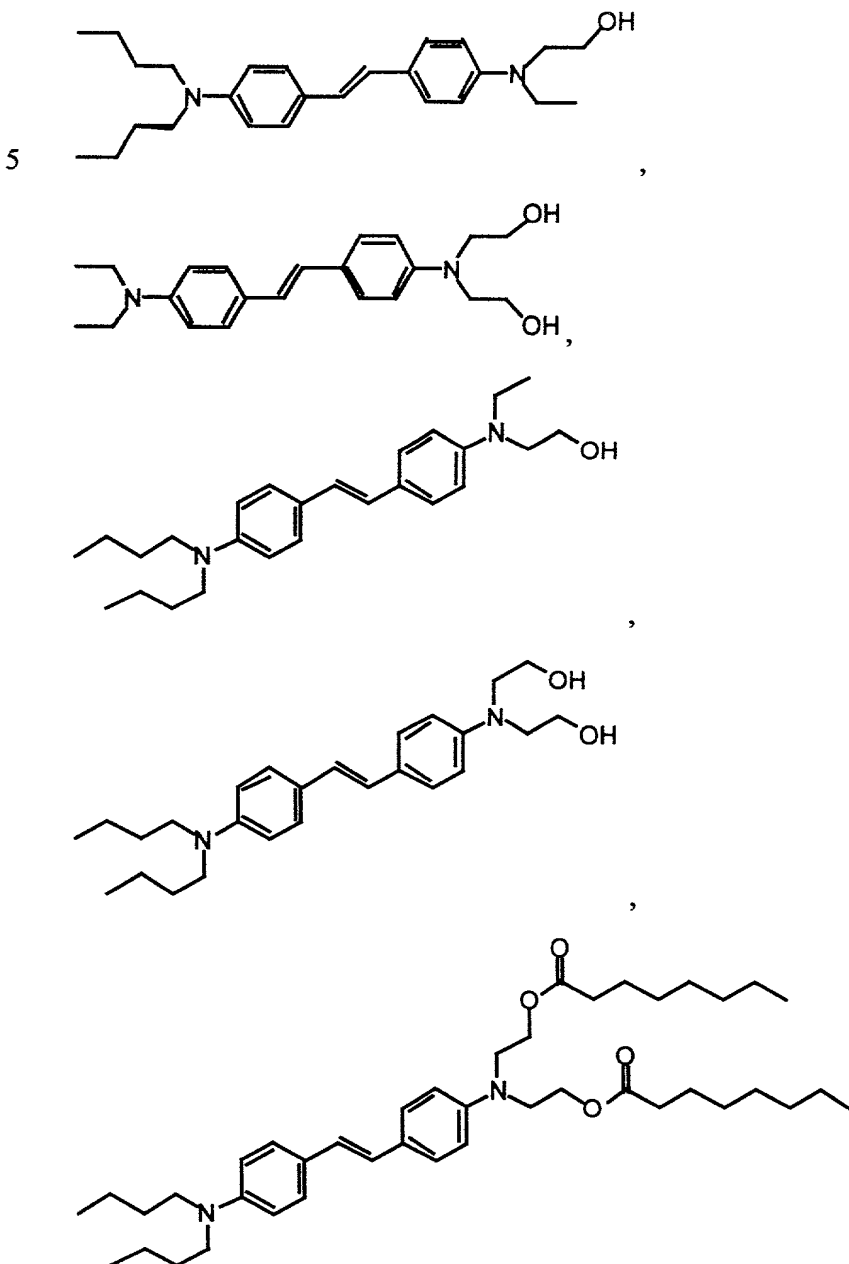
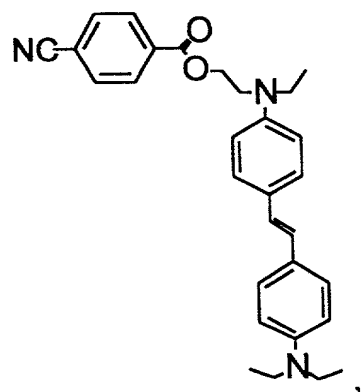
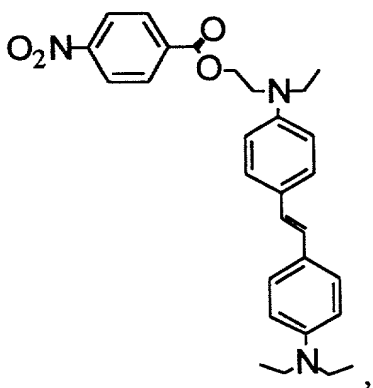
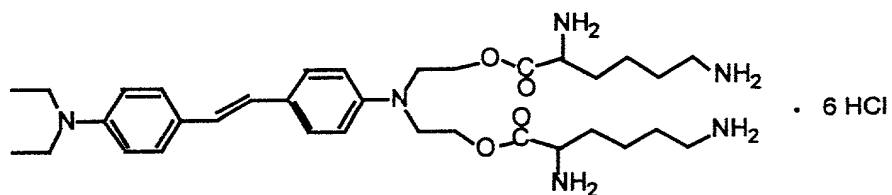
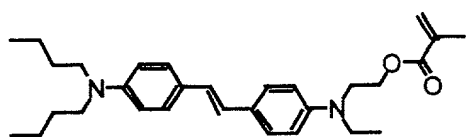
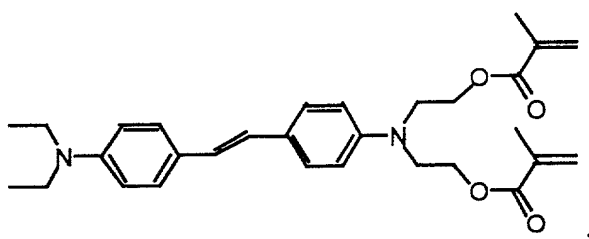


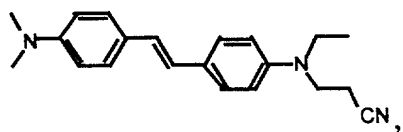
## CLAIMS

1. A composition capable of simultaneous two-photon absorption comprising a compound selected from the group consisting of

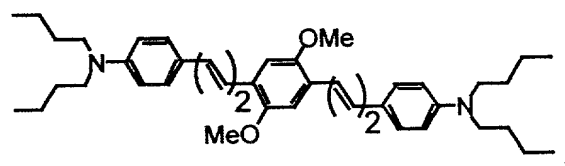
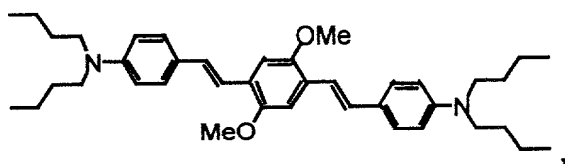
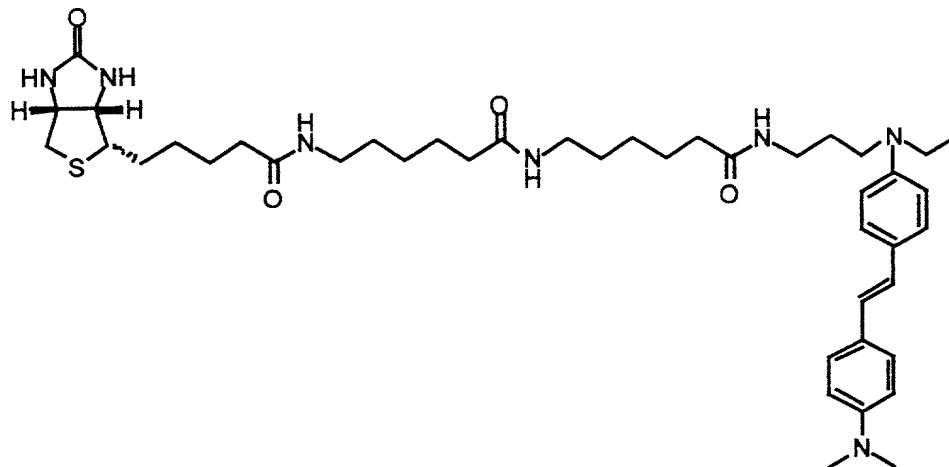
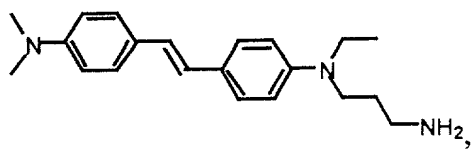




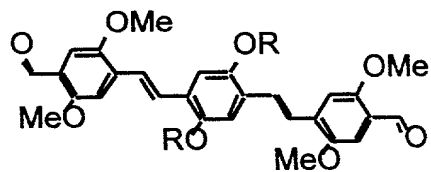
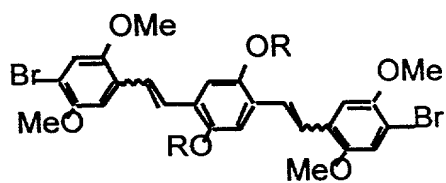
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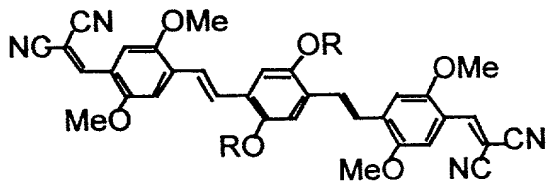
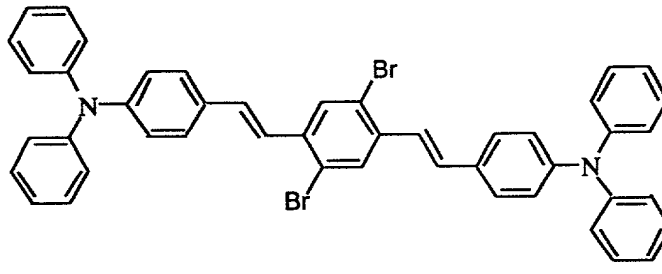
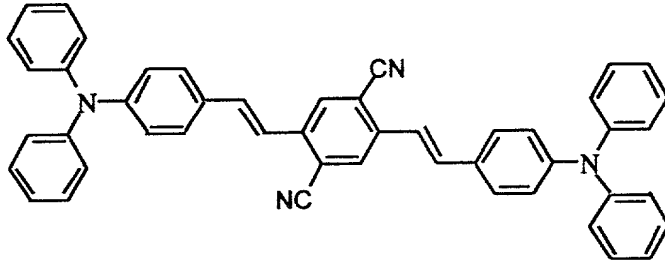
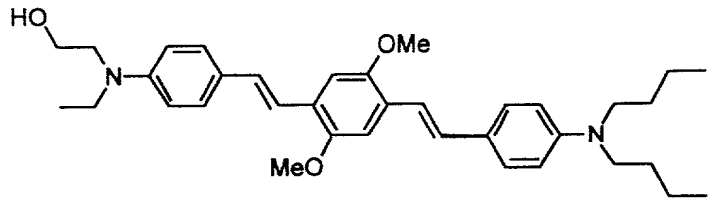
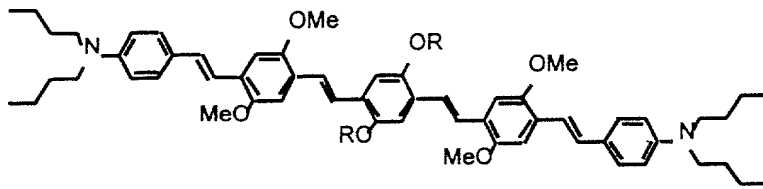


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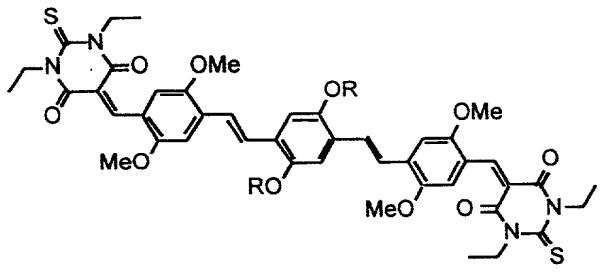


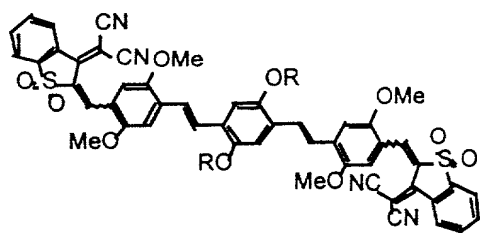
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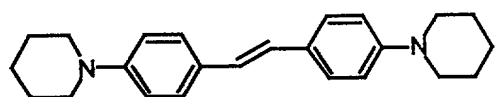
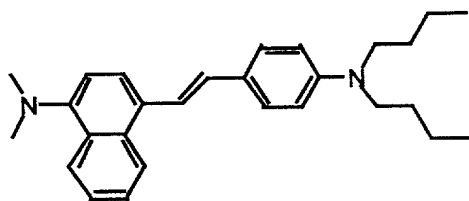
and mixtures thereof, where  $R=(CH_2)_{11}CH_3$ .

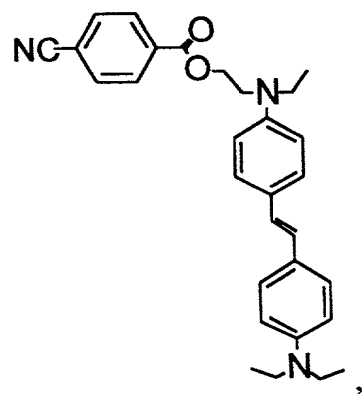
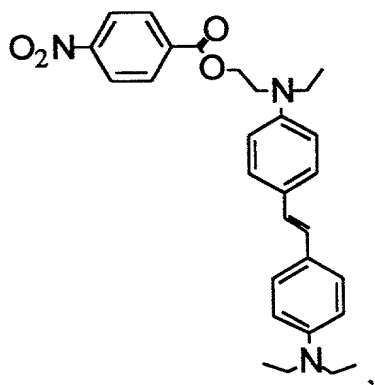
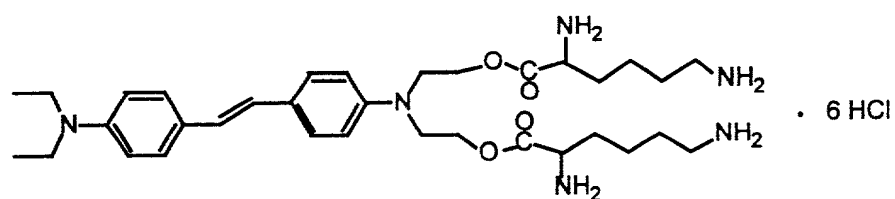
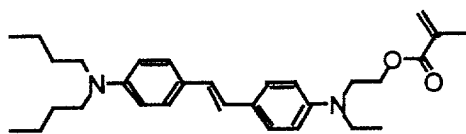
2. A method for preparing a compound in an electronically excited state, comprising the steps of:

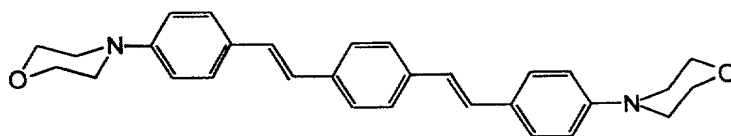
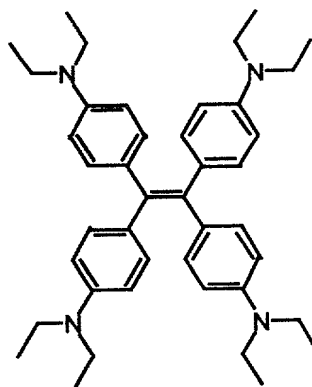
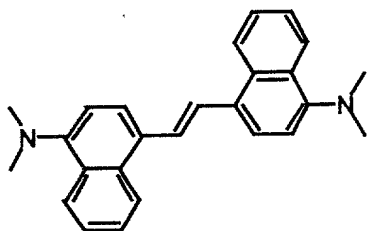
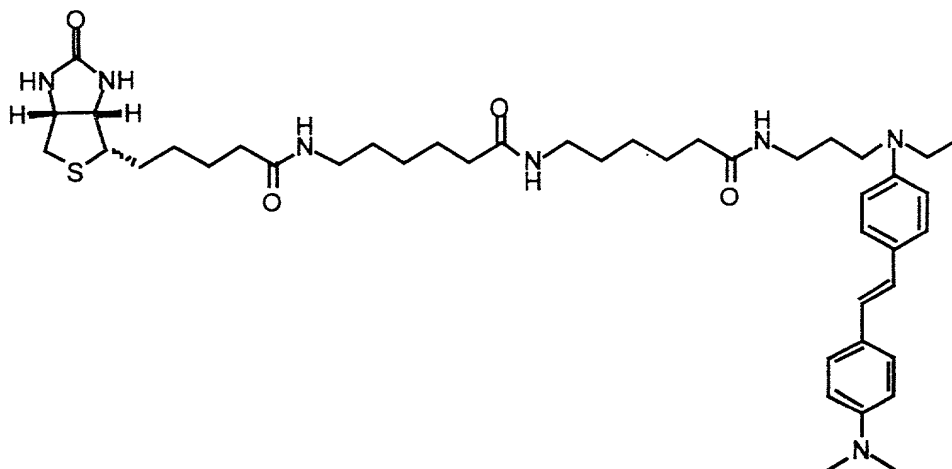
a) exposing a compound having the formula  $D_1-\Pi-D_2$  to radiation, wherein  $D_1$  and  $D_2$  are electron donor groups; and  $\Pi$  comprises a bridge of  $\pi$ -conjugated bonds connecting  $D_1$  and  $D_2$ ; and

- b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state.

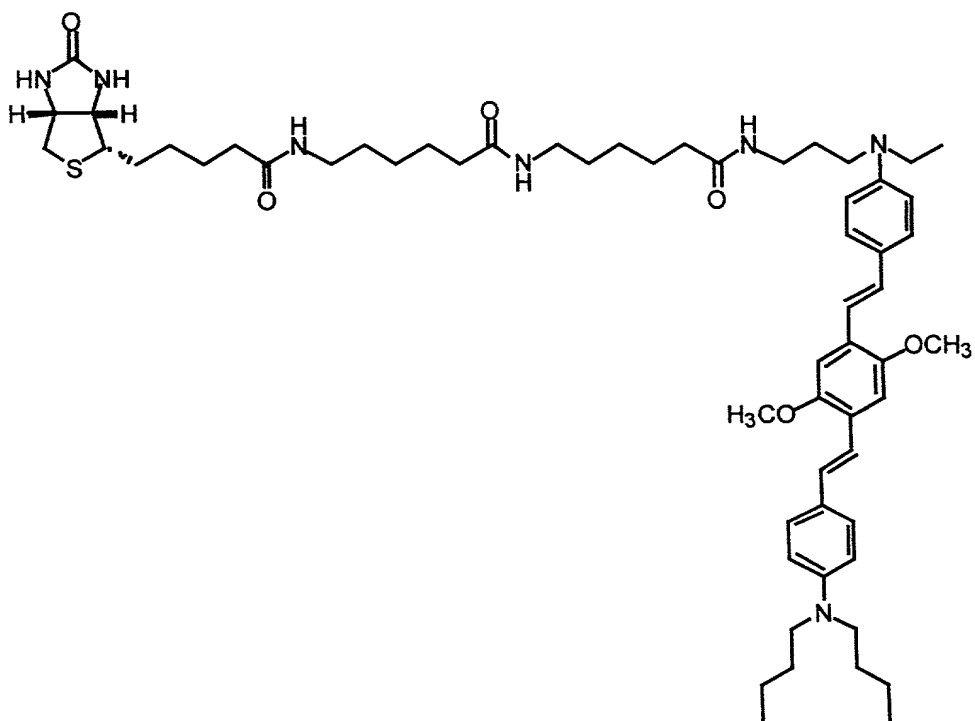
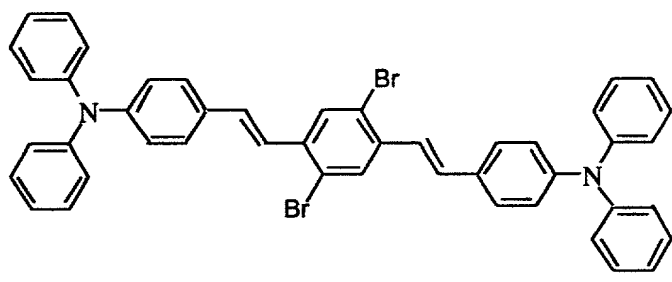
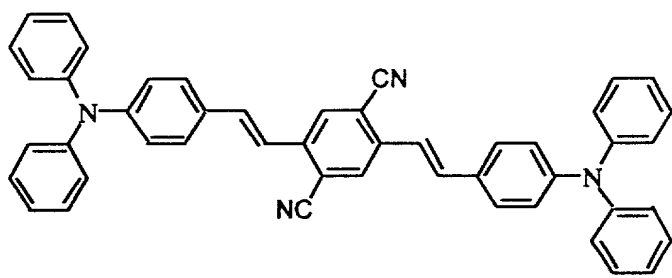
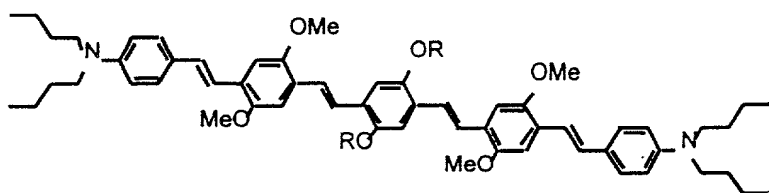
3. A method according to claim 2, wherein said compound is selected from the group consisting of





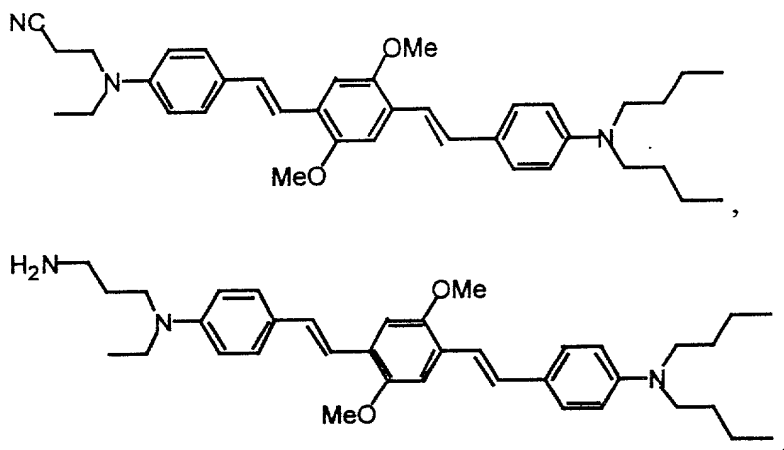


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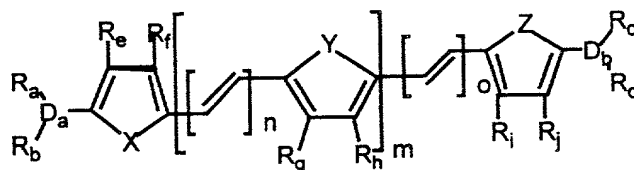
	Mean	SD	Min	Max
Age (years)	38.5	10.5	20	65
Gender				
Male	10	10	0	20
Female	10	10	0	20
Marital status				
Married	10	10	0	20
Single	10	10	0	20
Education (years)	12.5	2.5	8	16
Occupation				
Professional	10	10	0	20
Managerial	10	10	0	20
Technical	10	10	0	20
Service	10	10	0	20
Unemployed	10	10	0	20
Income (€)	1500	500	500	3000
Health status				
Good	10	10	0	20
Fair	10	10	0	20
Poor	10	10	0	20
Smoking status				
Smoker	10	10	0	20
Nonsmoker	10	10	0	20
Alcohol consumption (g/day)	20	20	0	100
Exercise (times/week)	2	2	0	5
Stress (scale 1-10)	5	3	1	10
Sleep quality (scale 1-10)	7	2	5	10
Depression (scale 1-10)	3	2	1	10
Life satisfaction (scale 1-10)	7	2	5	10
Overall health (scale 1-10)	7	2	5	10





and mixtures thereof, where  $R = (CH_2)_{11}CH_3$ .

4. A method according to claim 2, wherein said compound is further defined by a formula



- where  $D_a$  is selected from the group consisting of N, O, S and P;  
 where  $D_b$  is selected from the group consisting of N, O, S and P;  
 $m, n, o$  are integers such that  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ ; and  
 where:

X, Y, Z are independently selected from the group consisting of:  
 $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

- $R_a, R_b, R_c, R_d$  are independently selected from the group consisting of:  
 H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
 aromatic rings having up to 20 carbons in the aromatic ring framework; fused

aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins;  $(-\text{CH}_2)_\delta\text{SiCl}_3$ ;  $(-\text{CH}_2)_\delta\text{Si}(\text{OCH}_2\text{CH}_3)_3$ ; and  $(-\text{CH}_2)_\delta\text{Si}(\text{OCH}_3)_3$ ; where  $\delta < 25$ ;

5  $\text{R}_{a1}$ ,  $\text{R}_{a2}$ , and  $\text{R}_{a3}$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or methacryloyl chloride;

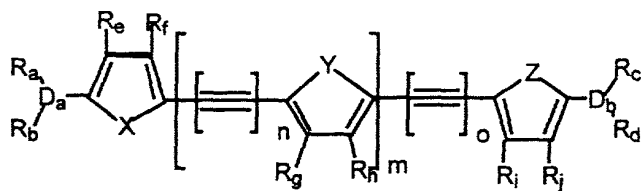
10  $\text{R}_e$ ,  $\text{R}_f$ ,  $\text{R}_g$ ,  $\text{R}_h$ ,  $\text{R}_i$ ,  $\text{R}_j$ ,  $\text{R}_k$ ,  $\text{R}_l$  and  $\text{R}_m$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{OR}_{b1}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{NR}_{b2}\text{R}_{b3}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{CONR}_{b2}\text{R}_{b3}$ , where  $\text{R}_{b1}$ ,  $\text{R}_{b2}$ , and  $\text{R}_{b3}$  are independently selected from the group consisting of a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, 15 ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{CN}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{Cl}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{Br}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{I}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{-Phenyl}$ , where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor 20 group containing more than two carbon atoms; a functional group derived from an amino acid and  $\text{NR}_{e1}\text{R}_{e2}$ ;  $\text{OR}_{e3}$ ; where  $\text{R}_{e1}$ ,  $\text{R}_{e2}$ ,  $\text{R}_{e3}$  are defined as for  $\text{R}_n$  and  $\text{R}_o$ , where  $\text{R}_n$  and  $\text{R}_o$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{OR}_{g1}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{NR}_{g2}\text{R}_{g3}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{CONR}_{g2}\text{R}_{g3}$ ; 25  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{CN}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{Cl}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{Br}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{I}$ ;  $(-\text{CH}_2\text{CH}_2\text{O})_\alpha(-\text{CH}_2)_\beta\text{-Phenyl}$ ; aryl groups; fused aromatic rings; polymerizable functionalities;

30  $\text{R}_{g1}$ ,  $\text{R}_{g2}$ , and  $\text{R}_{g3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin;

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ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.

5. A method according to claim 1, wherein said compound is further defined  
5 by a formula



where  $D_a$  is selected from the group consisting of N, O, S and P;

where  $D_b$  is selected from the group consisting of N, O, S and P;

$m, n, o$  are integers such that  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ ; and

- 10 where:

$X, Y, Z$  are independently selected from the group consisting of:  
 $CR_k=CR_l$ ; O; S; and  $N-R_m$ ;

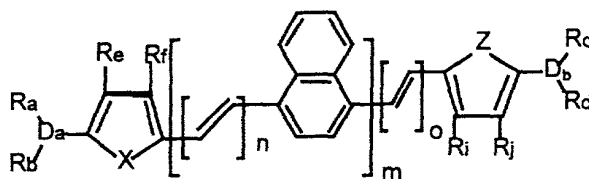
- $R_a, R_b, R_c, R_d$  are independently selected from the group consisting of:  
H; a linear or branched alkyl group with up to 25 carbons;  
15  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
aromatic rings having up to 20 carbons in the aromatic ring framework; fused  
20 aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;  
isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;  
 $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

$R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or methacryloyl chloride;

$R_e$ ,  $R_f$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently selected from a functional group derived from an amino acid, a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and  $NR_{e1}R_{e2}$ ;  $OR_{e3}$ ; where  $R_{e1}$ ,  $R_{e2}$ ,  $R_{e3}$  are defined as for  $R_n$  and  $R_o$ , where  $R_n$  and  $R_o$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{g1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{g2}R_{g3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{g2}R_{g3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; aryl groups; fused aromatic rings; polymerizable functionalities;

$R_{g1}$ ,  $R_{g2}$ , and  $R_{g3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.

6. A method according to claim 1, wherein said compound is further defined by a formula



5 where  $D_a$  is selected from the group consisting of N, O, S and P;

where  $D_b$  is selected from the group consisting of N, O, S and P;

$m, n, o$  are integers such that  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ ; and

where:

$X, Y, Z$  are independently selected from the group consisting of:

10  $CR_k=CR_l$ ; O; S; and  $N-R_m$ ;

$R_a, R_b, R_c, R_d$  are independently selected from the group consisting of:

H; a linear or branched alkyl group with up to 25 carbons;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;

15  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;

20  $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

$R_{a1}, R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or

25 methacryloyl chloride;

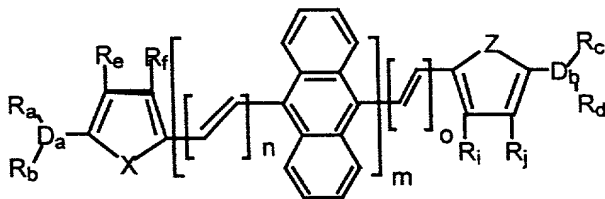
$R_e, R_f, R_i, R_j, R_k, R_l$  and  $R_m$  are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently  
 selected from a functional group derived from an amino acid; a polypeptide;  
 adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene,  
 5 cyanuric chloride and derivatives thereof or methacryloyl chloride;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic  
 framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor  
 10 group containing more than two carbon atoms; a functional group derived from an  
 amino acid and  $NR_{e1}R_{e2}$ ;  $OR_{e3}$ ; where  $R_{e1}$ ,  $R_{e2}$ ,  $R_{e3}$  are defined as for  $R_n$  and  
 $R_o$ , where  $R_n$  and  $R_o$  are defined as any member of the group consisting of H; a  
 linear or branched alkyl group with up to 25 carbons;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{g1}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{g2}R_{g3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{g2}R_{g3}$ ;  
 15  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; aryl groups; fused  
 aromatic rings; polymerizable functionalities;

$R_{g1}$ ,  $R_{g2}$ , and  $R_{g3}$  are independently selected from: H; a linear or  
 branched alkyl group with up to 25 carbons; a functional group derived from an  
 20 amino acid: a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin;  
 ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl  
 chloride.

7. A method according to claim 1, wherein said compound is further defined

25 by a formula



where  $D_a$  is selected from the group consisting of N, O, S and P;

where  $D_b$  is selected from the group consisting of N, O, S and P;

m, n, o are integers such that  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ ; and

where:

X, Y, Z are independently selected from the group consisting of:

5  $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

$R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  are independently selected from the group consisting of:

H; a linear or branched alkyl group with up to 25 carbons;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;

10  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of

aromatic rings having up to 20 carbons in the aromatic ring framework; fused

aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;

isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;

15  $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

$R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting

of: H; a linear or branched alkyl group with up to 25 carbons, a functional group

derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine;

uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or

20 methacryloyl chloride;

$R_e$ ,  $R_f$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the group

consisting of: H; a linear or branched alkyl group with up to 25 carbons;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently

25 selected from the group consisting of a functional group derived from an amino

acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene,

ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 <$

30  $\beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic

framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and NR<sub>e1</sub>R<sub>e2</sub>; OR<sub>e3</sub>; where R<sub>e1</sub>, R<sub>e2</sub>, R<sub>e3</sub> are defined as for R<sub>n</sub> and R<sub>o</sub>, where R<sub>n</sub> and R<sub>o</sub> are defined as any member of the group consisting of H; a  
 5 linear or branched alkyl group with up to 25 carbons; -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>OR<sub>g1</sub>;  
 -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>NR<sub>g2</sub>R<sub>g3</sub>; -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>CONR<sub>g2</sub>R<sub>g3</sub>;  
 -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>CN; -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>Cl; -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>Br;  
 -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>I; -(CH<sub>2</sub>CH<sub>2</sub>O)<sub>α</sub>-(CH<sub>2</sub>)<sub>β</sub>-Phenyl; aryl groups; fused  
 aromatic ring; polymerizable functionalities;

10 R<sub>g1</sub>, R<sub>g2</sub>, and R<sub>g3</sub> are independently selected from: H; a linear or  
 branched alkyl group with up to 25 carbons; a functional group derived from an  
 amino acid: a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin;  
 ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl  
 chloride.

15

8. A method according to claim 1, wherein said bridge is substituted with one  
 or more electron acceptor groups.

20

9. A method for preparing a compound in an electronically excited state,  
 comprising the steps of:

a) exposing a compound having the formula A<sub>1</sub>-Π-A<sub>2</sub> to radiation,  
 wherein A<sub>1</sub> and A<sub>2</sub> are electron acceptors; and Π comprises a bridge of π-  
 conjugated bonds connecting A<sub>1</sub> and A<sub>2</sub>; and

25

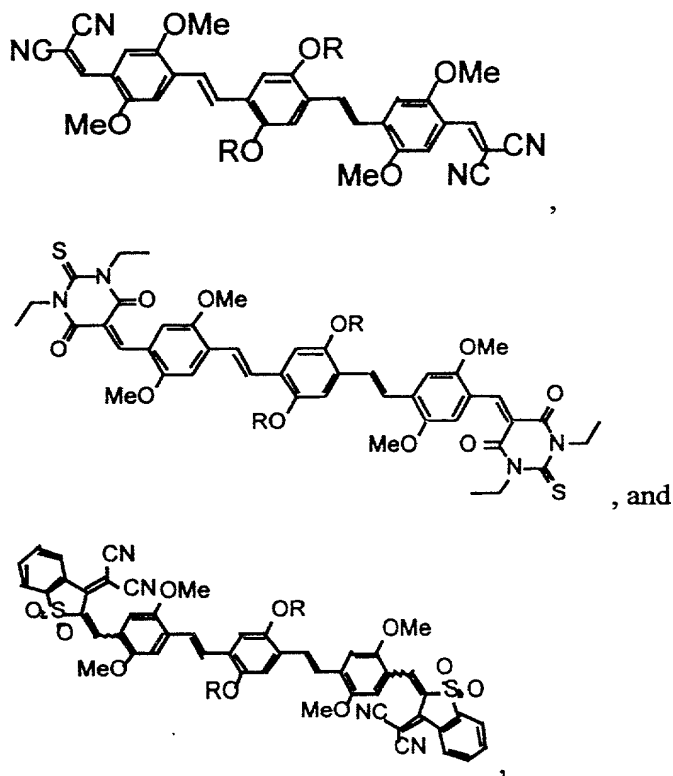
b) converting said compound to a multi-photon electronically excited  
 state upon simultaneous absorption of at least two photons of said radiation by said  
 compound, wherein the sum of the energies of all of said absorbed photons is  
 greater than or equal to the transition energy from a ground state of said compound  
 to said multi-photon excited state and wherein the energy of each absorbed photon  
 is less than the transition energy between said ground state and the lowest single-

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photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state.

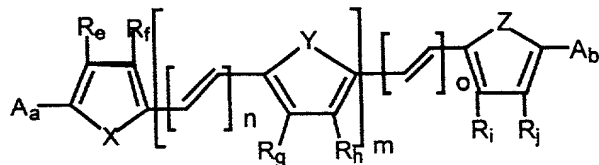
10. A method according to claim 9, wherein said compound is selected from the group consisting of



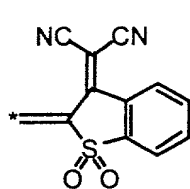
where  $R = (CH_2)_{11}CH_3$ .

10

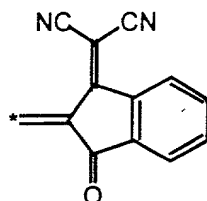
11. A method according to claim 9, wherein said compound is further defined by a formula



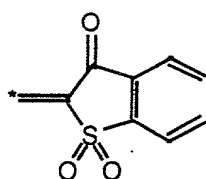
where  $A_a$  and  $A_b$  can be independently selected from: CHO; CN;  $NO_2$ , and



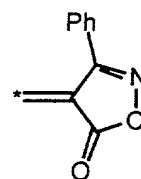
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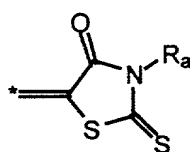
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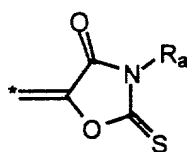
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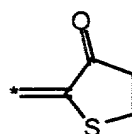
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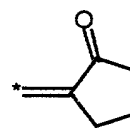
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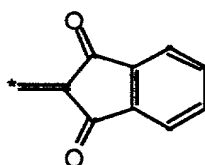
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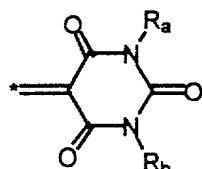
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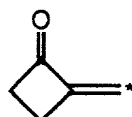
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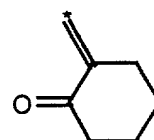
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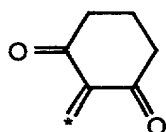
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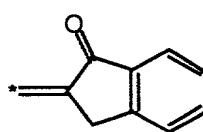
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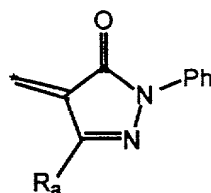
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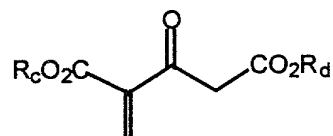
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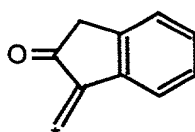
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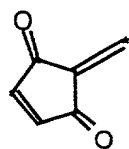
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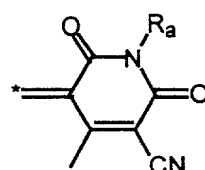
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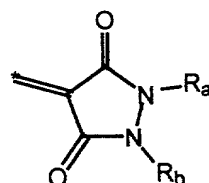
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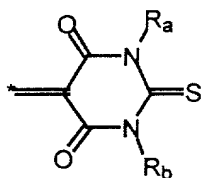


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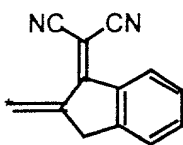


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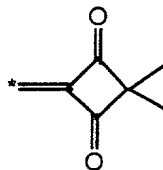
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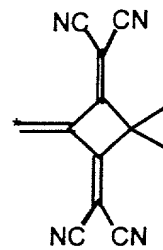
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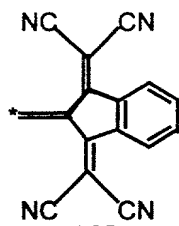
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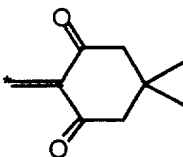
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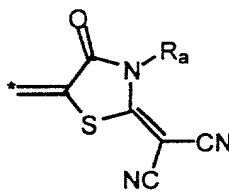
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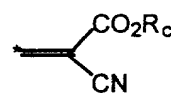
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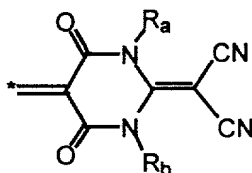
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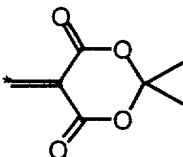
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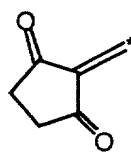
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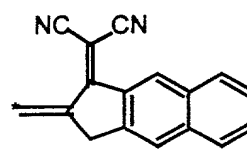
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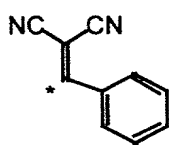
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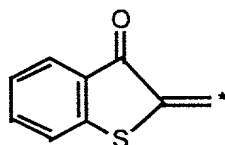
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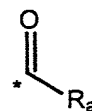
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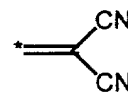
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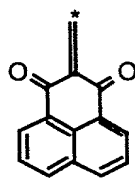
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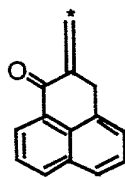
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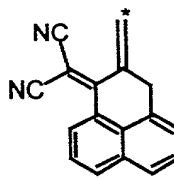
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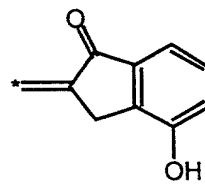
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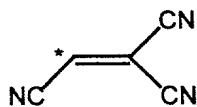
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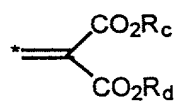
A39



A40



A41



A42

in addition  $A_a$  and  $A_b$  can be independently selected from Br, Cl, and I; and

5 where  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ .

and where:

X, Y, Z are independently selected from the group consisting of:  $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

$R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  are independently selected from the group consisting of:

- 5 H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
 10 aromatic rings having up to 20 carbons in the aromatic ring framework; fused  
 aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;  
 isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;  
 $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

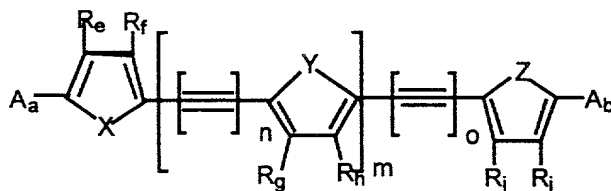
- 15  $R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting  
 of: H; a linear or branched alkyl group with up to 25 carbons, a functional group  
 derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine;  
 uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or  
 methacryloyl chloride;

- 20  $R_e$ ,  $R_f$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the  
 group consisting of: H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently  
 selected from the group consisting of a functional group derived from an amino  
 acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene,  
 25 ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic  
 framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor  
 30 group containing more than two carbon atoms; a functional group derived from an

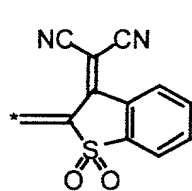
- amino acid and  $\text{NR}_{\text{e}1}\text{R}_{\text{e}2}$ ;  $\text{OR}_{\text{e}3}$ ; where  $\text{R}_{\text{e}1}$ ,  $\text{R}_{\text{e}2}$ ,  $\text{R}_{\text{e}3}$  are defined as for  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$ , where  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{OR}_{\text{g}1}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{NR}_{\text{g}2}\text{R}_{\text{g}3}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CONR}_{\text{g}2}\text{R}_{\text{g}3}$ ;  
 5  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CN}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Cl}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Br}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{I}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}$ -Phenyl; aryl groups; fused aromatic rings; polymerizable functionalities;

- $\text{R}_{\text{g}1}$ ,  $\text{R}_{\text{g}2}$ , and  $\text{R}_{\text{g}3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.  
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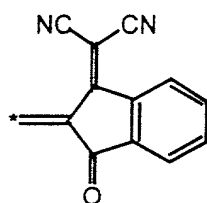
12. A method according to claim 9, wherein said compound is further defined  
 15 by a formula



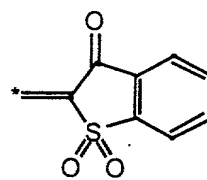
where  $\text{A}_a$  and  $\text{A}_b$  can be independently selected from: CHO; CN;  $\text{NO}_2$ , and



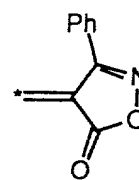
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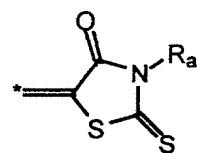
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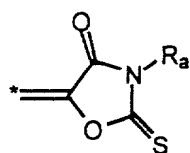
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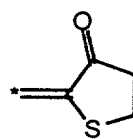
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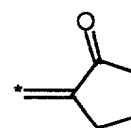
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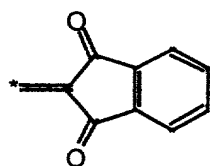
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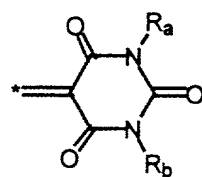
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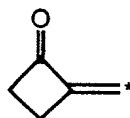
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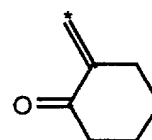
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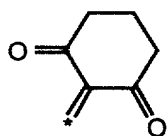
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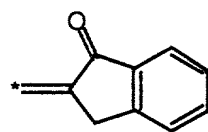
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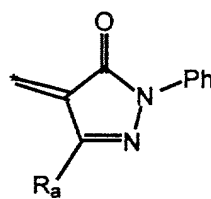
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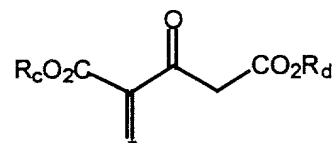
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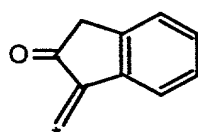
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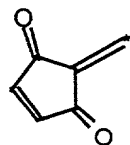
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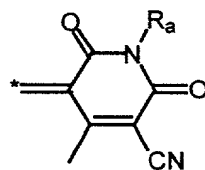
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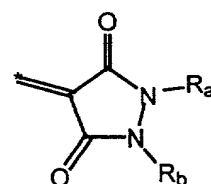
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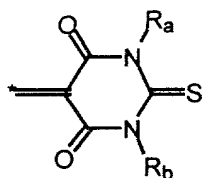
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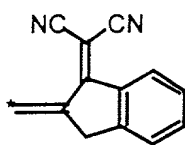
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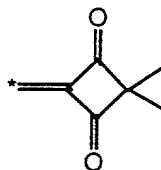
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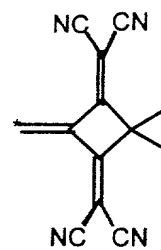
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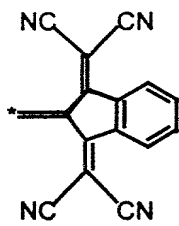
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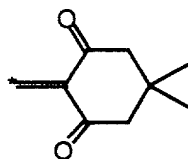
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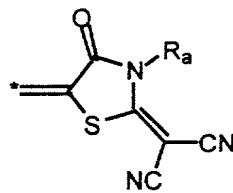
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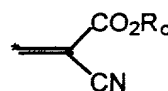
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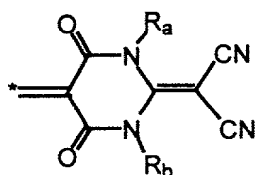
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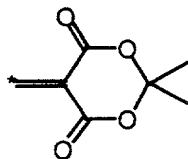
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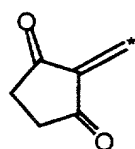
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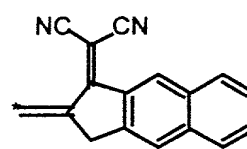
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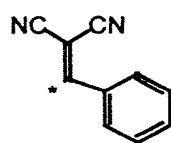
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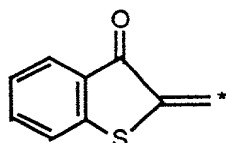
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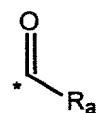
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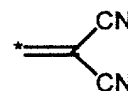
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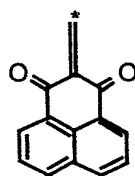
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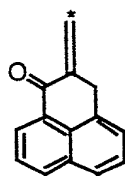
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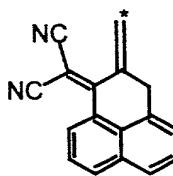
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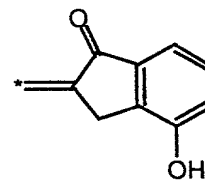
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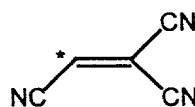
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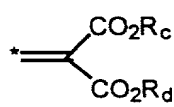
A39



A40



A41



A42

in addition  $A_a$  and  $A_b$  can be independently selected from Br, Cl, and I; and

5 where  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ .

; and where:

X, Y, Z are independently selected from the group consisting of:  $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

$R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  are independently selected from the group consisting of:

- 5 H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
 10 aromatic rings having up to 20 carbons in the aromatic ring framework; fused  
 aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;  
 isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;  
 $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

- 15  $R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting  
 of: H; a linear or branched alkyl group with up to 25 carbons, a functional group  
 derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine;  
 uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or  
 methacryloyl chloride;

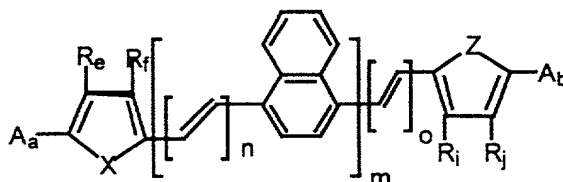
- 20  $R_e$ ,  $R_f$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the  
 group consisting of: H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently  
 selected from the group consisting of a functional group derived from an amino  
 acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene,  
 25 ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic  
 framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor  
 30 group containing more than two carbon atoms; a functional group derived from an



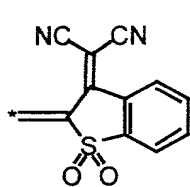
amino acid and  $\text{NR}_{\text{e}1}\text{R}_{\text{e}2}$ ;  $\text{OR}_{\text{e}3}$ ; where  $\text{R}_{\text{e}1}$ ,  $\text{R}_{\text{e}2}$ ,  $\text{R}_{\text{e}3}$  are defined as for  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$ , where  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{OR}_{\text{g}1}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{NR}_{\text{g}2}\text{R}_{\text{g}3}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CONR}_{\text{g}2}\text{R}_{\text{g}3}$ ;   
 5  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CN}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Cl}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Br}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{I}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}$ -Phenyl; aryl groups; fused aromatic rings; polymerizable functionalities;

$\text{R}_{\text{g}1}$ ,  $\text{R}_{\text{g}2}$ , and  $\text{R}_{\text{g}3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin;   
 10 ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.

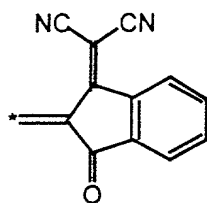
13. A method according to claim 9, wherein said compound is further defined   
 15 by a formula



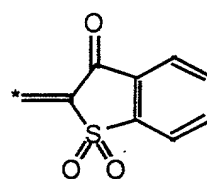
where  $\text{A}_a$  and  $\text{A}_b$  can be independently selected from: CHO; CN;  $\text{NO}_2$ , and



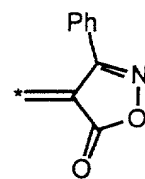
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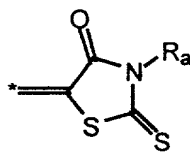
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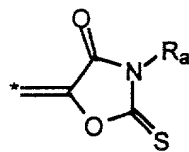
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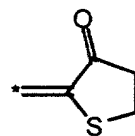
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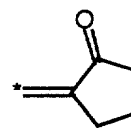
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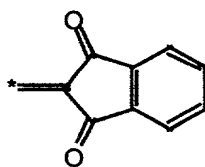
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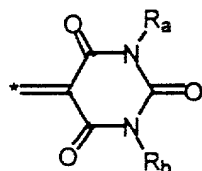
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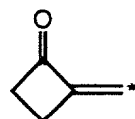
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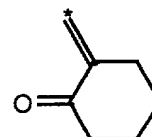
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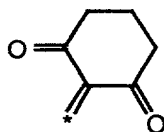
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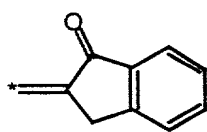
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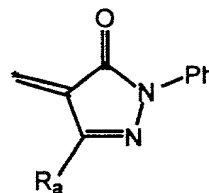
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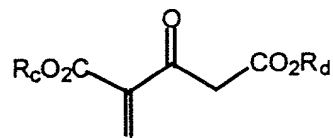
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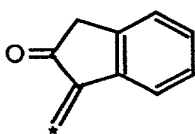
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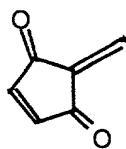
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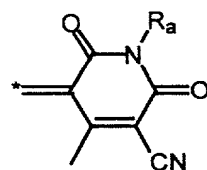
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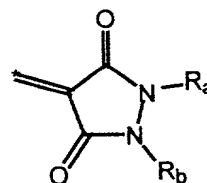
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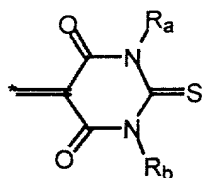


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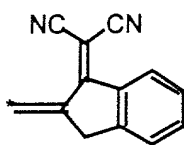


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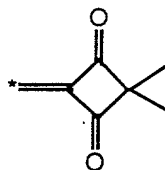
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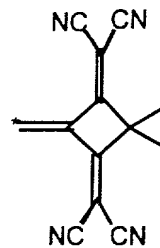
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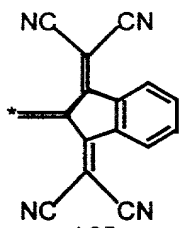
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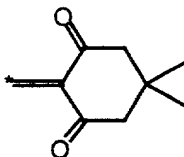
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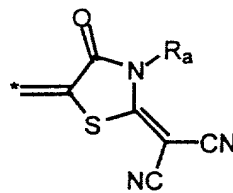
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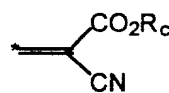
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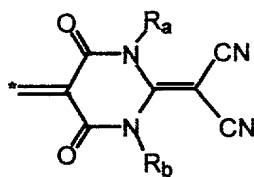
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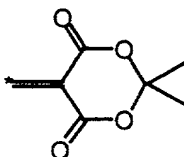
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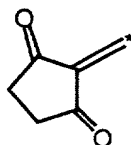
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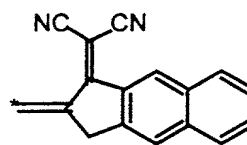
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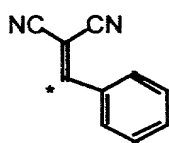
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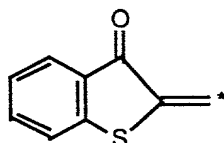
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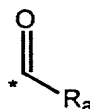
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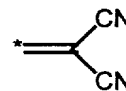
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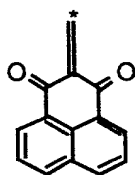
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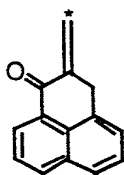
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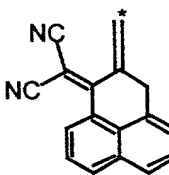
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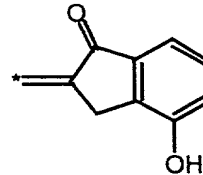
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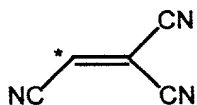
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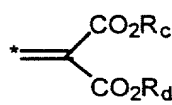
A39



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A42

in addition  $A_a$  and  $A_b$  can be independently selected from Br, Cl, and I; and

5 where  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ .

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; and where:

X, Y, Z are independently selected from the group consisting of:  $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

$R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  are independently selected from the group consisting of:

- 5 H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
 10 aromatic rings having up to 20 carbons in the aromatic ring framework; fused  
 aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;  
 isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;  
 $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

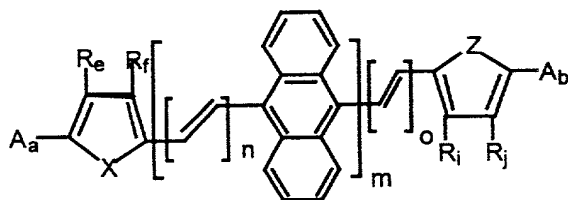
- 15  $R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting  
 of: H; a linear or branched alkyl group with up to 25 carbons, a functional group  
 derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine;  
 uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or  
 methacryloyl chloride;

- 20  $R_e$ ,  $R_f$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the group  
 consisting of: H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently  
 selected from the group consisting of a functional group derived from an amino  
 acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene,  
 25 ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic  
 framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor  
 30 group containing more than two carbon atoms; a functional group derived from an

amino acid and  $\text{NR}_{e1}\text{R}_{e2}$ ;  $\text{OR}_{e3}$ ; where  $\text{R}_{e1}$ ,  $\text{R}_{e2}$ ,  $\text{R}_{e3}$  are defined as for  $\text{R}_n$  and  $\text{R}_o$ , where  $\text{R}_n$  and  $\text{R}_o$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{OR}_{g1}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{NR}_{g2}\text{R}_{g3}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CONR}_{g2}\text{R}_{g3}$ ;  
 5  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CN}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$ ;  
 $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{-Phenyl}$ ; aryl groups; fused aromatic rings; polymerizable functionalities;

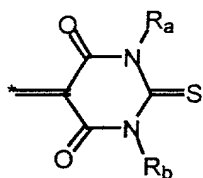
$\text{R}_{g1}$ ,  $\text{R}_{g2}$ , and  $\text{R}_{g3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.

14. A method according to claim 9, wherein said compound is further defined  
 15 by a formula

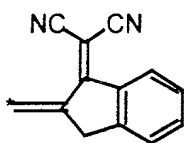


where  $\text{A}_a$  and  $\text{A}_b$  can be independently selected from: CHO; CN;  $\text{NO}_2$ , and

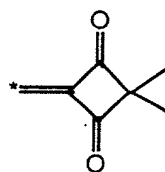




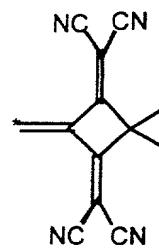
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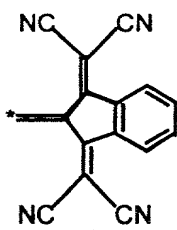
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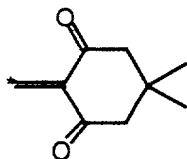
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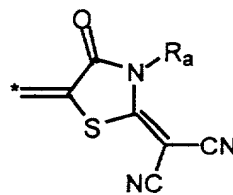
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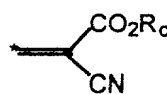
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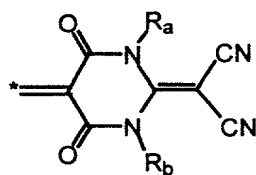
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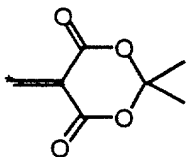
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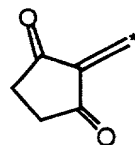
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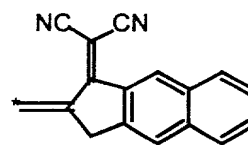
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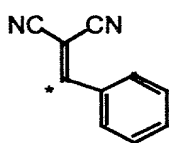
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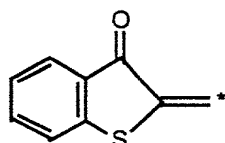
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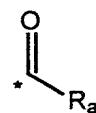
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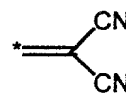
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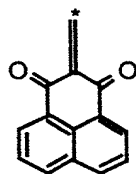
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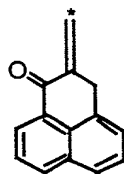
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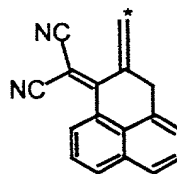
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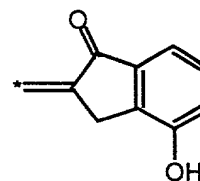
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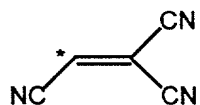
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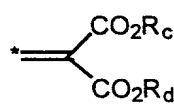
A39



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in addition  $A_a$  and  $A_b$  can be independently selected from Br, Cl, and I; and

5 where  $0 \leq m \leq 10$ ,  $0 \leq n \leq 10$ ,  $0 \leq o \leq 10$ .

; and where:

X, Y, Z are independently selected from the group consisting of:  
 $CR_k=CR_l$ ; O; S; and N- $R_m$ ;

$R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  are independently selected from the group consisting of:

- 5 H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where  $0 < \alpha < 10$  and  $1 < \beta < 25$ , a group of  
 10 aromatic rings having up to 20 carbons in the aromatic ring framework; fused  
 aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate;  
 isothiocyanate; epoxides; strained ring olefins;  $(-CH_2)_\delta SiCl_3$ ;  
 $(-CH_2)_\delta Si(OCH_2CH_3)_3$ ; and  $(-CH_2)_\delta Si(OCH_3)_3$ ; where  $\delta < 25$ ;

- 15  $R_{a1}$ ,  $R_{a2}$ , and  $R_{a3}$  are independently selected from the group consisting  
 of: H; a linear or branched alkyl group with up to 25 carbons, a functional group  
 derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine;  
 uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, or  
 methacryloyl chloride;

- 20  $R_e$ ,  $R_f$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$  and  $R_m$  are independently selected from the group  
 consisting of: H; a linear or branched alkyl group with up to 25 carbons;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$ , where  $R_{b1}$ ,  $R_{b2}$ , and  $R_{b3}$  are independently  
 selected from the group consisting of a functional group derived from an amino  
 acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene,  
 25 ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$ ;  
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$ ;  $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where  $0 < \alpha < 10$  and  $1 < \beta < 25$ ; a group of aromatic rings having up to 20 carbons in the aromatic  
 framework; fused aromatic rings; CHO; CN; NO<sub>2</sub>; Br; Cl; I; phenyl; an acceptor  
 30 group containing more than two carbon atoms; a functional group derived from an



- amino acid and  $\text{NR}_{\text{e}1}\text{R}_{\text{e}2}$ ;  $\text{OR}_{\text{e}3}$ ; where  $\text{R}_{\text{e}1}$ ,  $\text{R}_{\text{e}2}$ ,  $\text{R}_{\text{e}3}$  are defined as for  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$ , where  $\text{R}_{\text{n}}$  and  $\text{R}_{\text{o}}$  are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{OR}_{\text{g}1}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{NR}_{\text{g}2}\text{R}_{\text{g}3}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CONR}_{\text{g}2}\text{R}_{\text{g}3}$ ;  
 5  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CN}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Cl}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Br}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{I}$ ;  $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}$ -Phenyl; aryl groups; fused aromatic rings; polymerizable functionalities;

$\text{R}_{\text{g}1}$ ,  $\text{R}_{\text{g}2}$ , and  $\text{R}_{\text{g}3}$  are independently selected from: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof or methacryloyl chloride.

15. A method according to claim 9, wherein said bridge is substituted with one or more electron donor groups.

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